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D. ARBITMAN ETAL

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SQUEEZE BOTTLE DISPENSER

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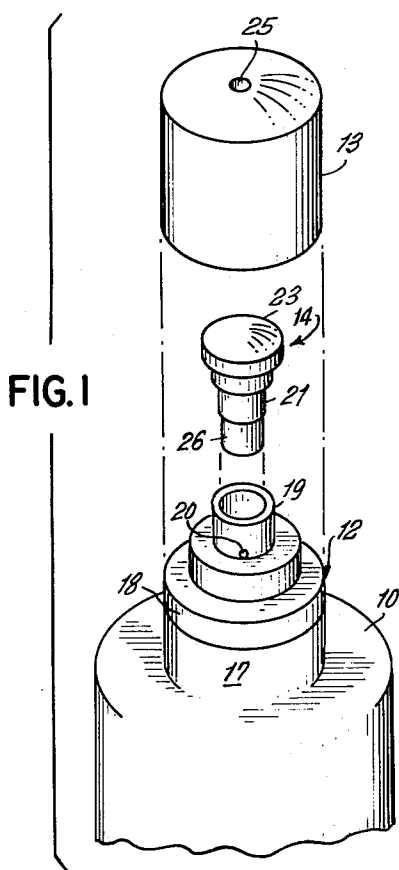


FIG. 2

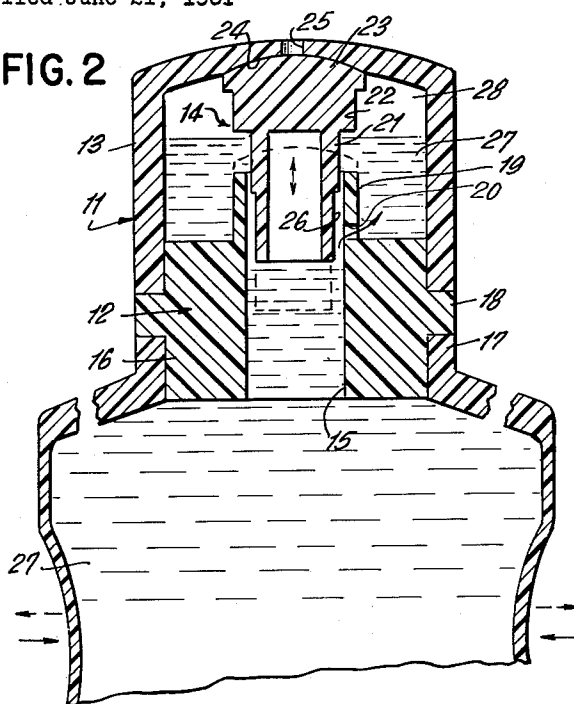


FIG. 3

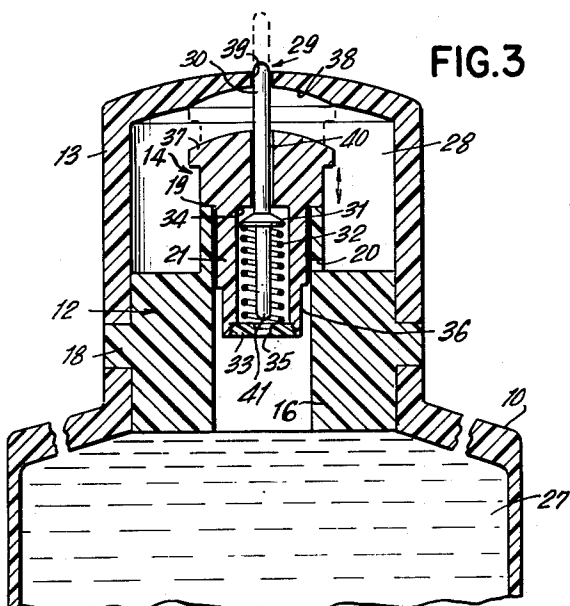


FIG. 5

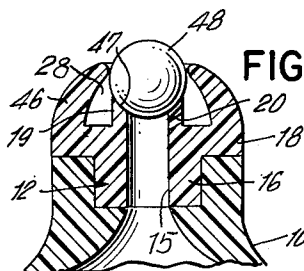
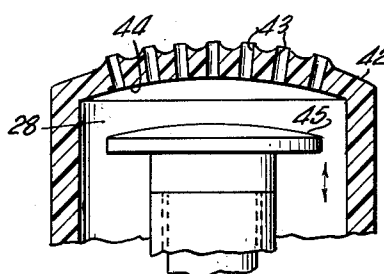


FIG. 4



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SQUEEZE BOTTLE DISPENSER

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This invention relates to fluid dispensing caps for liquid
containers and particularly to closures which control the
flow of fluids by means of a valve and reservoir incor- 10
porated therein.

Where it is desired to restrict or meter the amount of
fluid which can be poured from a container at a given
time it is necessary to interpose a valve between the
container and the dispensing portion of the assembly.
Presently known devices have employed highly compli- 15
cated and expensive structures for this purpose. Other
known devices make it impossible to remove all of the
contents from the container. Still other prior art de-
vices leak and spill the fluid where it is not wanted.

Accordingly it is an object of the present invention to
provide fluid dispensing caps which will overcome the
shortcomings of prior art devices.

Another object of the present invention is to provide
a cap which will dispense a metered amount of fluid
from a container.

A further object of the present invention is to provide
a cap of the fluid metering type which is simple in structure 30
and inexpensive to manufacture.

An object of the present invention is to provide a cap
which is extremely well adapted for use as a deodorant
dispenser.

Another object of the present invention is to provide a
cap which will not leak and which is suited for use with
squeeze-type containers.

A feature of the present invention is its use of a simple
valve to control the passage of fluid from the container.

Another feature of the present invention is its fluid
receiving reservoir. 40

Still another feature of the present invention is the use
of the squeeze bottle to pump the fluid into the reservoir.

A feature of the present invention is its use of a floating
valve structure to control the passage of the fluid. 45

Another feature of the present invention is its reservoir
emptying structure.

A further, non-elected, feature of the present invention
is its positive auxiliary valve construction to limit flow.

The invention consists of the construction, combination
and arrangement of parts, as herein illustrated, described
and claimed.

In the accompanying drawings, forming a part hereof
are illustrated several forms of embodiment of the invention,
in which drawings similar reference characters designate 55
corresponding parts, and in which:

FIGURE 1 is a somewhat isometric exploded view of
a fluid dispensing cap according to the present invention.

FIGURE 2 is a vertical section taken through the cap
shown in FIGURE 1 in the assembled condition.

FIGURE 3 is a vertical section taken through a second,
non-elected, embodiment of the invention showing an
auxiliary valve structure in elevation.

FIGURE 4 is a fragmentary view partly in vertical
section showing still another form of fluid dispensing head. 65

FIGURE 5 is a vertical section taken through a ball-
type applicator cap, a further, non-elected, embodiment
of the present invention.

Referring to the drawings and specifically to FIGURES
1, 2, 10 indicates a container of the squeeze-type such as
a bottle made of polyethylene, neoprene, rubber or the
like. A fluid dispensing closure 11 is secured to the 70

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container 10 in a manner shown in FIGURE 2. The
closure 11 has a base or block 12 upon which there is
received an applicator dispensing cap 13. A valve mem-
ber 14 is slidably carried within a central bore 15 in the
block 12. The block 12 is provided with a tubular por-
tion 16 which is received within the neck 17 of the
container 10. The tubular portion 16 may be cemented
in place or pressed into the neck to form a fluid tight
engagement with the neck 17. A flange 18 on the tubular
portion 16 overlies the neck 17 of the container 10 as
shown in FIGURES 1 and 2, to prevent leaking at this
point.

The block 12 is provided with an upstanding cylindrical
valve guide 19 and a lateral opening 20 therein. The
valve member 14 is formed with a stepped stem 21 which
fits freely within the valve guide 19. The valve stem 21
has a shoulder 22 at one end thereof to prevent the valve
member 14 from moving too far into the container 10.
The shoulder 22 forms the bottom surface of a valve
disc 23 which is shaped to conform to a valve seat 24
formed on the inner surface of the applicator cap 13.
The stepped stem 21 is reduced in size as indicated at 26
so that fluid 27 can pass from the container 10 between
the stem 21 and the valve guide 19 and through the
opening 20. The fluid 27 can then fill the chamber 28
hereinafter referred to as the reservoir formed between
the block 12 and the applicator cap 13.

As shown in FIGURE 2 the applicator cap 13 is slipped
over the block 12 and bears against the upper surface of
the flanged portion 18 to form a fluid tight seal around the
said block 12.

When it is desired to use the dispensing closure in
order to remove a specific amount of fluid from the con-
tainer 10, the container is squeezed thereby forcing valve
member 14 upwardly along with fluid 27 which flows
through the opening 20 and into the reservoir 28. When
a desired amount of fluid has been forced into the reser-
voir, the release of squeezing pressure on container 10
creates a vacuum in the container drawing the valve 14
back into valve guide 19 closing opening 20. The bottle
may then be tipped to permit the fluid in reservoir 28 to
flow out of the opening 25 in the cap 13. As the con-
tainer 10 is squeezed the pressure will force the valve
member 14 upward into sealing contact with the valve
seat 24 as shown in FIGURE 2. When the pressure on
the container 10 is released, following the filling of the
reservoir 28, the valve member 14 will be pulled back
into the valve guide 19 and permit the fluid to pass
through the opening 25. It is proposed to make the valve
member 14 of polystyrene, methyl methacrylate, or some
other suitable plastic. As will be apparent to those
skilled in the art, the head of the valve member 14 is made
larger than the shank of the valve member 14. As a
result, the air pressure acting on the head of the valve
member 14 acts over a greater area, than the pressure
exerted by the fluid on the reverse end of the valve mem-
ber at the shank. This differential in exposed surface
area serves to insure maintenance of the valve member
in retracted position when pressure has been released from
the squeeze bottle. The relative dimensions between the
head portion of the valve member 14 and the shank por-
tion of the valve member may be modified in accordance
with known design principles, depending on the fluids
to be dispensed so as to insure retraction of the valve
member within the cylindrical bore of valve guide 19
upon the release of pressure on the squeeze bottle.

After a desired amount of fluid has been dispensed and
the container stood on its base (not shown) in the usual
manner, the fluid remaining in the reservoir 28 will flow
back into the container 10 through the opening 20. This
action can be accelerated by holding the assembly in an
upright position and squeezing the container 10 followed

by a quick release of the pressure. The container 10 will thereupon act as a pump to suck the fluid from the reservoir 28 through the opening 20 back into the container.

It will be seen that the foregoing operation will allow no more fluid to be dispensed from the reservoir 28 than was initially forced into it by squeezing the container 10. In this manner, waste of the fluid can be avoided and also objectionable spilling during the dispensing of the contents of the container.

Referring to FIGURE 3 there is shown another, non-elected, embodiment of the present invention in which the valve member 14 is provided with an auxiliary valve member 29. The valve member 29 consists of an elongated pin 30 upon which there is provided a valve disc portion 31. The valve disc portion 31 serves to support one end of a coil spring 32 which is disposed about the lower end of the pin 30. The bottom of the spring 32 bears against a small disc 33 which is carried in the bottom of a chamber 34, cut into the stem 21. The disc 33 is provided with a central opening 35 so that fluid 27 can pass from the container 10 into the chamber 34 to force the valve disc upward and seal the chamber when the bottle 10 is squeezed. The length of the chamber 34 is somewhat greater than the combined length of the flange 31 and extended spring 32, so that the pin 30 can move within the chamber 34 despite the presence of the spring 32 to release the valve 31 from its sealing position at the top of the chamber 34, when the container is set down in the upright position.

It will be observed that the reduced stepped portion 36 of the valve member 37, shown in FIGURE 3, is shorter than the reduced portion 26 of the valve member 14 in FIGURE 2. As a result, when the valve member 37 is seated upon the tubular portion 16, fluid cannot pass from the container 10 through the opening 20 because the surface of the valve stem overlies the said opening.

When the container shown in FIGURE 3 is squeezed, fluid in the container 10 forces the valve member 37 upwardly until it assumes the position shown in dashed lines. The pin 30 extends through the opening 39 which is provided in the center of the seat 38. After the reservoir 27 is filled by reason of the passage of fluid from the container 10 through the opening 20, the container is tipped for use. By bringing a surface into contact with the end of the pin 30, the valve member 37 is positively forced against the tubular portion 16. Further pressure on the pin 30 forces it down through the central bore 40 in the valve member 37 thereby compressing the spring 32 and forcing the end of the pin 41 into the opening 35 in the disc 33. Fluid therefore is positively prevented from passing from the container 10 into the reservoir 28. This construction is important where it is desired to meter a specific amount of fluid from the container 10. In metering the fluid the proper amount is forced into the reservoir 28 by squeezing the container 10. Thereafter, the pin 30 is pressed inwardly and only that fluid which is in the reservoir 28 can escape through the opening 39 around the pin 30.

In FIGURE 4 there is shown a further type of applicator cap generally indicated at 42. In this form of the invention the cap 42 is provided with a plurality of dispensing openings 43 which lead into a large valve seat 44. The valve seat 44 receives the top of an enlarged valve

disc 45, which serves to seal the chamber 28 when the closure is being filled. In all other respects the remainder of the dispensing structure may be the same as that shown in FIGURES 2 or 3.

The bore 40 in the valve member 37 in FIGURE 3 must be sufficiently large to permit air to pass between the valve member and the pin 30. The air will enable the container 10 to return to its original shape after squeezing.

Referring to FIGURE 5 there is shown a further, non-elected, embodiment of the present invention in which a ball type applicator has been incorporated into the fluid dispensing structure. In this form of the invention the block 12 is fitted into the container 10 in a fluid tight manner and the flanged portion 18 is provided with a hollow hemispheric dispensing cap 46. The hemispheric dispensing cap 46 is integral with the flanged portion 18 in FIGURE 5 but may be made a separate piece without departing from the spirit of the invention. The cylindrical portion 19 on the block is formed with a seat 47 to receive the ball 48. The ball extends through an opening in the top of the hemispheric dispensing cap 46, and serves to apply the fluid within the dispensing cap in the well known manner. When the container 10 is squeezed the fluid within the container is forced through the opening 20 in the wall of the cylindrical portion 19 and enters a reservoir 28 in the hereinabove described manner. When the container is tipped the fluid will wet the ball 48 and be spread upon any surface on which the ball is rubbed.

Having thus fully described the invention, what is claimed as new and desired to be secured by Letters Patent of the United States, is:

1. A fluid dispensing closure assembly for use with a squeeze type container comprising a block for fluid tight engagement with the container, a bore in the block in communication with the container, a cylindrical portion on the block opposite the container and around the block bore, a lateral opening in the cylindrical portion communicating with the bore, a valve member comprising a valve stem slidably carried within the cylindrical portion and a valve disc on the valve stem, a dispensing cap overlying the valve member and secured to the block to form with said block a reservoir around the valve member, a valve seat on the inside of the dispensing cap to receive the valve member and at least one opening in the valve seat to permit fluid within the chamber to flow out of the said dispensing cap.

2. A closure assembly according to claim 1 in which the valve stem is of stepped construction to provide a fluid path between the valve stem and the lateral opening in the cylindrical portion.

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